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RESEARCH ARTICLE

Qualitative Exploration of Factors Making Physics Challenging for Students

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Abstract

The majority of students tend to perceive physics as a challenging subject. While numerous studies have investigated the factors contributing to this challenge, more comprehensive qualitative research needs to be conducted that delves deeply into this phenomenon, particularly within the constructivist paradigm. This study employs the constructivist paradigm as a framework to examine the elements that contribute to students' perception of physics as a challenging subject. This study employed a descriptive qualitative method. The data for this study were collected through a thematic analysis of comments from the Quora platform. The sample consisted of ten comments from the Quora website, selected based on the highest recommendations. The data were subjected to a thematic analysis using ATLAS.ti software version 9. The study identified seven primary themes that analyze the elements contributing to the challenges in acquiring knowledge in the field of physics. These topics include the nature of physics itself, the role of teachers, the characteristics of students, the disparity between physicists and non-experts, the curriculum, parental influence, and the discipline's historical development. The challenges encountered in studying physics arise from intricate and interconnected causes. Further research could be undertaken to examine efficient learning strategies to overcome these challenges and explore additional variables that may contribute to this phenomenon.

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INTRODUCTION

Physics is a challenging discipline due to its demand for higher-order cognitive processes to comprehend (Nurhaniah et al., 2022). Physics learning aims to enhance students' comprehension of concepts, principles, scientific competencies, and procedural abilities in science (Ilhami et al., 2023). However, students often encounter difficulties in problem-solving and experience a sense of inadequacy when attempting to comprehend the learning material (Bray & Williams, 2020). Ady and Warliani (2022) demonstrated that students' learning difficulties stem from internal factors, specifically aspects of intelligence and student motivation, which lead to the assumption that physics is inherently challenging.

Challenges in acquiring physics knowledge may arise from both internal and external influences. Internal variables originate from the pupils themselves. A primary issue is students' disinterest in learning physics. Student indifference to a subject might lead to boredom (Nawahdani et al., 2022). The boredom can disturb students' focus in comprehending the information being communicated. The effect of this can be observed in the academic performance of students. Students without enthusiasm for physics will become demotivated and perceive the course as challenging. Students exhibiting minimal interest in physics may adversely affect learning outcomes (Aldila et al., 2020). Other issues may arise from external circumstances, such as restricted practice sessions and textbooks (Siahaan, 2024). Research indicates that acquiring physics knowledge is frequently regarded as tedious and unengaging due to the reliance on lectures devoid of experimental activities or contextually relevant projects. The two are interconnected, which may lead students to experience boredom, diminished engagement, and a decline in enthusiasm for learning physics (Rose Amanda Puri & Riki Perdana, 2023).

Despite numerous research on students' challenges in studying physics, further investigation is required to gain a more comprehensive understanding of the underlying reasons. Prior studies commonly employ a quantitative methodology, which, although offering a general understanding, frequently needs to fully grasp the intricacy of students' experiences (Abdussamad & Sik, 2021). Creswell (2014) highlights the significance of qualitative exploratory methods in producing a more comprehensive comprehension of regions not currently well studied. These methods may encompass comprehensive interviews with students, classroom observations, document and learning material analysis, exploratory case studies, theme analysis, or interactive approaches.

A lack of research currently investigates this issue using a qualitative approach, particularly within the constructivist paradigm. Prior research often deviates from the positivism paradigm by employing a quantitative methodology, such as assessing the magnitude of student challenges in specific academic areas (Ady & Warliani, 2022). Previous studies investigating the challenges students face in learning physics have primarily employed quantitative approaches, which often focus on measuring the extent of difficulties but fail to capture the depth and complexity of students' experiences. These studies tend to rely on surveys or assessments, which may overlook nuanced perceptions and contextual factors influencing students' struggles. Depending on the characteristics of the learning environment, this may lead to an insufficient comprehension of pertinent non-quantitative aspects, such as motivation or the dynamics of the learning context, which should have been further emphasized. (Sundaro, 2022). Moreover, while some qualitative studies exist, they often lack a comprehensive exploration of the underlying factors within a specific theoritical framework. This study addresses these gaps by adopting a qualitative approach grounded in the constructivist paradigm, allowing for a deeper exploration of students' perspectives. By analyzing textual comments from Quora using thematic analysis, this research reveals not only the key themes contributing to the perception of physics as difficult but also the intricate relationships between these themes. Unlike prior research, which remains fragmented or limited to surface-level analysis, this study provides a more holistic and nuanced understanding of the challenges, bridging the disparity between quantitative findings and qualitative depth. Moreover, the findings may provide a foundation for developing more effective learning systems customized to individual requirements.

This study explores the factors contributing to students' perception of physics as a challenging subject, employing a qualitative approach within the constructivist paradigm. The research addressed the following question: What factors influence students' views of physics as difficult? By utilizing thematic analysis of high-engagement posts from the Quora platform, the study intended to provide a more comprehensive understanding of the complexities surrounding physics education, moving beyond the limitations of quantitative methodologies prevalent in previous research.

METHOD

Research Design

The study employed a descriptive qualitative method. This approach was selected based on its alignment with the research aims, specifically to elucidate the elements contributing to students' perceptions of physics as a challenging subject. The descriptive qualitative approach enables researchers to thoroughly investigate and comprehend individuals' experiences, perceptions, and perspectives in depth (Creswell & Poth, 2016).

Sample and Data Collection

The samples used for this study consist of ten remarks extracted from the Quora online platform. Quora is an interactive question-and-answer platform that enables users to pose inquiries and contribute responses based on their expertise and personal experiences. The platform's primary objective is to aggregate and disseminate knowledge from diverse perspectives, thereby facilitating discourse on various topics, encompassing educational and scientific domains (Anggraeni, 2023). The sample selection was based on the primary criterion of posts that obtained the highest recommendations from the Quora algorithm. These remarks were contributed by subject matter experts in physics and space science, including physics teachers, holders of master's degrees in theoretical physics, PhD researchers in astrophysics, and professionals affiliated with space exploration organizations, ensuring the reliability and depth of the analyzed perspectives.

Data Analysis

The data collected from Quora was subjected to thematic analysis using ATLAS.ti software version 9. The data for this study consist of textual comments collected from the Quora platform, which represent students' perceptions of the challenges they face in learning physics. These textual comments were analyzed using thematic analysis, a systematic approach for identifying, organizing, and interpreting patterns or themes within qualitative data.

The analysis involved coding the data into smaller, meaningful units (codes), which were then grouped to form broader themes and sub-themes. The analysis was conducted using ATLAS.ti software version 9, which facilitated the coding process, theme identification, and the visualization of relationships among the themes. This thematic analysis with ATLAS.ti visually organizes the connections between the research question, contributing factors, and the detailed explanations derived from the codes. The output is divided into themes and sub-themes, each consisting of several related codes, represented visually in the ATLAS.ti output.

Thematic analysis is a methodical approach used to uncover, analyze, and present patterns or themes in data (Braun & Clarke, 2006). The process of thematic analysis entails the systematic categorization of data, the identification of recurring themes, the thorough examination of these themes, and the presentation of the analysis findings in the form of a comprehensive report. The approach of thematic analysis utilized ATLAS.ti version 9 as a tool. The utilization of ATLAS.ti facilitated the researcher in methodically organizing the data and enhanced the reliability of the research outcomes. ATLAS.ti is a software tool that can help with the practical and orderly organization, coding, and analysis of research data (Afriansyah, 2016).

The researcher adhered to the procedures proposed by Braun and Clarke (2006) in the thematic analysis approach, which include: (1) becoming acquainted with the data, (2) creating initial codes, (3) identifying themes, (4) reviewing themes, (5) defining and labeling themes, and (6) preparing the report. This procedure guarantees that the analysis is carried out methodically and that robust facts substantiate the study findings.

RESULT AND DISCUSSION

The study identified seven primary themes that elucidate the variables contributing to students' perceptions of physics as challenging. The seventh criterion encompassed physics features, educators, learners, the disparity between physicists and non-experts, curriculum, parental influence, and the genesis of the discipline. Figure 1 depicts the spread of result patterns derived from the ATLAS.ti network.

The research question, "Why is difficult?" is depicted in the output by the red box (The red box serves as the foundational root from which all other themes, sub-themes, and codes originate, establishing the core inquiry that branches into various contributing factors and detailed explanations). The themes that emerge as contributing factors to this perception are represented in blue boxes. Green boxes indicate sub-themes, which further break down these factors into sub-factors. Finally, the white boxes represent specific codes, providing more detailed explanations of the themes or sub-themes.

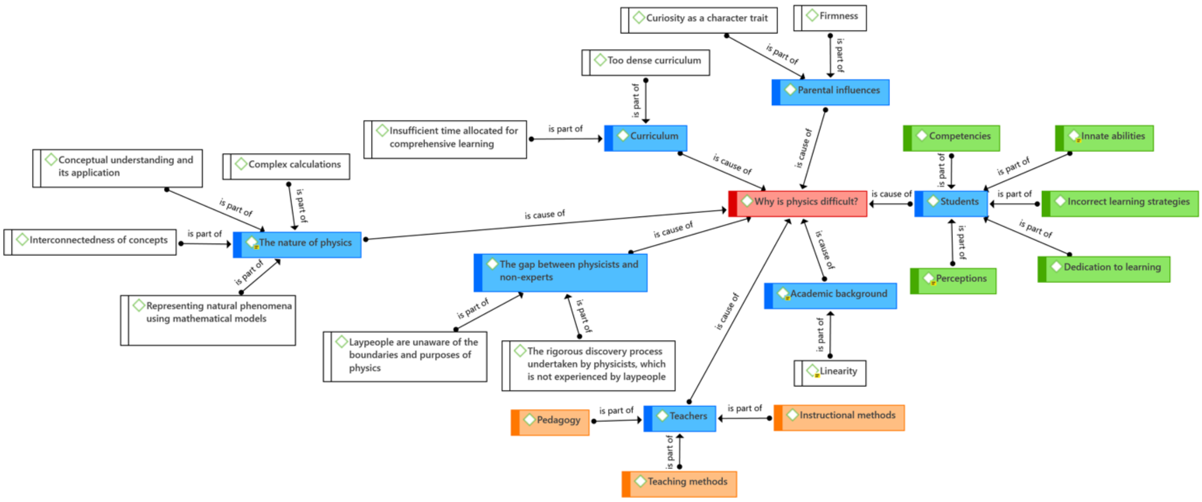

Figure 1. The pattern of factors that influence physics is complex.
Source: Calculation conducted by the author using ATLAS.ti v.9

Theme 1: Physical characteristics

The characteristics of physics subjects are a primary determinant of the perceived difficulty of physics among students. The challenges faced by students in comprehending physics subjects are often attributed to deficiencies in mathematical comprehension and the inability to effectively apply physics principles to real-world scenarios. Recent studies have highlighted that students struggle significantly with the integration of mathematical concepts within physics, which is essential for problem-solving and understanding complex physical phenomena. The importance of attaching physical meaning to mathematical symbols when applying mathematical knowledge in physics, suggests that a lack of this understanding can hinder students' ability to solve physics problems effectively (Akhsan et al., 2023; Phage, 2020; Serhane et al., 2020). The study can be examined in terms of physics as a scientific discipline that mathematically models the cosmos, the intricate nature of its computations, the interconnectedness of its concepts, and the prerequisite of profound comprehension of these concepts before their application to natural occurrences. Rasyid et al. (2024) indicated that applying process skills in physics education can assist students in attaining learning objectives, including identifying concepts, principles, or theories that correspond with the designated fundamental competencies.

Physics endeavors to identify regularities in the cosmos and express them in mathematical form. Vaz (2024) demonstrates that abstractions in physics, exemplified by the Standard Model, offer significant predictive capability. This model has flaws, including the inability to incorporate gravity and dark matter, which are essential elements of the cosmos. Nevertheless, computations in physics frequently prove to be excessively intricate in achieving absolute precision, particularly in highly restricted circumstances, such as when specific assumptions are employed. The rationale behind this approach is that physics does not directly investigate reality but instead depicts it through abstractions that are subsequently expressed in mathematical terms. Although these abstractions are valuable for doing calculations and making predictions, they may only sometimes encompass the entirety of actual reality. Kuo et al. (2020) analyzed that abstraction in physics is beneficial for streamlining computations and formulating predictions, although it must accurately represent reality.

Xie et al. (2021) indicated that forming connections between physical patterns, such as electron activity, is complex. They underscored that the abstract equations pertaining to the electron wave function must be converted into a more tangible form to execute calculations. Conversely, Johnson et al. (2024) emphasized that computational methods in physics must adhere to rigorous standards, particularly about their capacity to produce predictions that can be empirically tested and validated. These two investigations offer significant insights into the difficulties correlating physics theory with empirical validation.

The interdependence of concepts in physics is likewise a formidable obstacle. The physics study resembles a sophisticated suspense film, where students must attentively observe and retain each lesson and all the associated notions in their memory. Thus, pupils can only unravel the enigma, namely the resolution of the provided challenge. The issue lies in the interconnectedness of all occurrences in physics. Furthermore, even in cases where it is not essential to comprehend the preceding content to grasp the new content, the new material is frequently presented by drawing comparisons with the previous material. When delving into general relativity, which is Einstein’s theory of gravity, it is commonly instructed by employing Newtonian mechanics, Newton’s theory of gravity, as a foundational framework for comprehension. Typically, a physics problem is resolved by integrating multiple concepts. Failure to fully comprehend a crucial topic will prevent students from solving the problem. Students can employ the concept of pictorial analogies and constructivist learning approaches to enhance their comprehension of physics concepts. Recent studies have demonstrated that visual aids can facilitate better understanding and retention of information among students. Jumintono et al. (2022) demonstrated that visual comparisons can enhance students’ academic performance and long-term comprehension of physics principles. This aligns with findings from Amin et al. (2023) and Jumintono et al. (2022), who emphasize that visual aids, when integrated into learning approaches, can enhance students’ critical thinking and engagement, particularly in mathematics, which shares conceptual similarities with physics. Sezer and Karataş (2022) found that analogies have been proven effective in aiding students’ comprehension of abstract and intricate scientific subjects. The study discovered that using analogies can enhance students’ academic performance in comprehending scientific subjects. Moreover, using varied learning models, such as conceptual change models in the research by Adriana Sari et al. (2021), will facilitate students’ conceptual understanding of physics. Physics education should prioritize constructivist-based and active learning methods to enhance students’ comprehension of physics concepts (Saputra & Mustika, 2022).

Ultimately, physics can be divided into two crucial components: comprehension of concepts and practical implementation. Both hold equal significance and require equal

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time and effort to achieve mastery. The two concepts pertain to the fundamental nature of physics, which involves the ongoing cognitive process of transitioning between tangible and conceptual ideas to acquire a practical comprehension of the universe's functioning.

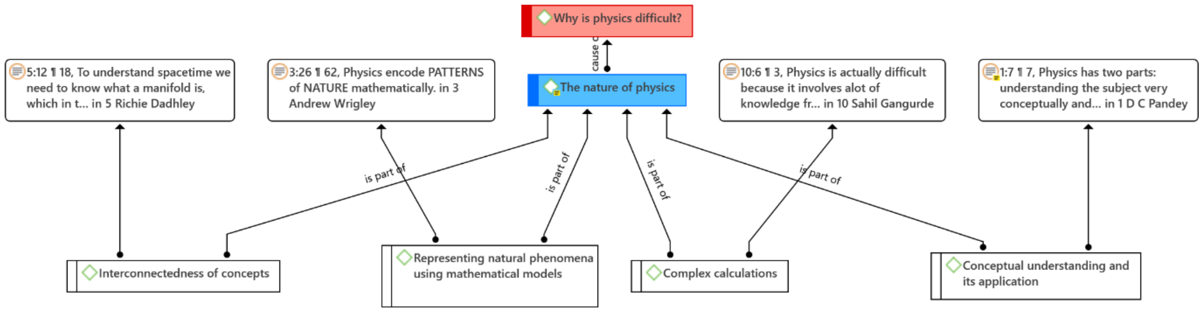

Figure 2. Display of physics characteristics network
Source: Calculation conducted by the author using ATLAS.ti v.9

Theme 2: Teacher

The teacher has a pivotal role in the acquisition of knowledge in the field of physics. When questioned about the main contributors to the notion that physics is challenging, one of the most common responses is the teacher. Frequently, grievances regarding students' aversion to physics due to the teacher's dullness, intensity, or excessive strictness. These analytical findings of the research data support our theoretical hypothesis. The issue arises from three primary factors: the educators' instructional approach, teaching methodologies, and pedagogical techniques. Ghosh and Sigh (2024) discovered that the pedagogical proficiency of physics educators significantly influences student learning outcomes. The research demonstrates that educators' proficient command of pedagogy in physics instruction can enhance students' academic performance.

The pedagogical methods employed by physics teachers could be more suitable. Most teachers teach physics in a manner akin to applied mathematics, even though physics encompasses a significantly more comprehensive range of topics. The curriculum in North America often places excessive emphasis on covering a wide range of topics but fails to delve into the underlying concepts adequately. Teachers frequently find themselves trapped in the monotonous practice of memorizing formulas without first developing a profound comprehension of fundamental principles. The utilization of unsuitable parallels in elucidating concepts further exacerbates the issue. The study by Halmuniati et al. (2022) found that physics educators encounter challenges in creating suitable instructional resources due to students' deficient foundational mathematical skills, inadequate facilities and infrastructure, limited diversity and innovation in teaching methods, and insufficient time allotted to accomplish learning goals. Consequently, the pedagogical expertise of physics educators and their capacity to impart a profound comprehension of physics concepts significantly impact students' grasp of the subject (Ghosh & Sigh, 2024).

In addition, the instructional techniques employed are frequently less diverse. The absence of laboratory and demonstration activities challenges students to visualize and apply crucial concepts. The methodology must be more varied and cater to students' learning styles. Instead, it should incorporate a mix of teacher-centered and student-centered approaches alternatingly. Moreover, the pedagogy employed by numerous physics instructors needs to be more suitable. These are the primary causes of the teaching deficiencies in physics. Pedagogical enhancement is necessary to improve the quality of physics education by using a more interactive and contextualized approach.

The challenges related to teaching methods, learning methods, and pedagogy teachers employ contribute to students' perception of physics as a complex subject. Enhancing the quality in these three dimensions is crucial for enhancing the comprehensibility and appeal of physics education for students.

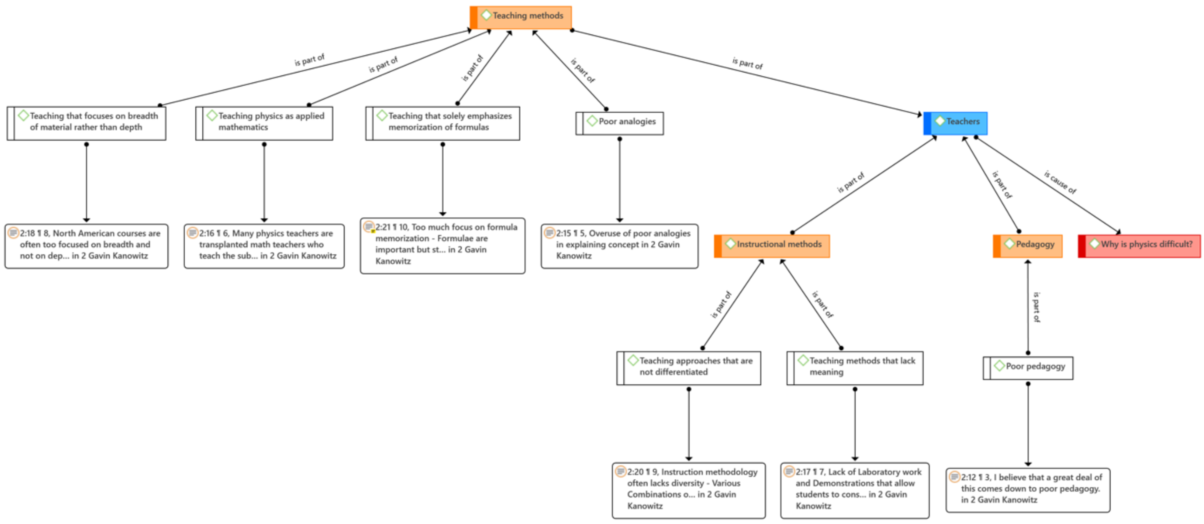

Figure 3. Teacher network display
Source: Calculation conducted by the author using ATLAS.ti v.9

Theme 3: Students

Figure 4 shows the student network display. The student theme contains five sub-categories: natural ability, thirst for knowledge, proficiency, perception, and ineffective learning methods. Acquiring knowledge of physics from infancy significantly impacts an individual's aptitude for learning physics, particularly in terms of numerical acuity and spatial cognition from a young age. Therefore, it is unsurprising that physicists typically exhibit a high average IQ. However, intrinsic factors alone are insufficient. Acquiring mastery of physics is not an instantaneous process. The human brain does not possess inherent mathematical capabilities. Thus, it necessitates the development of such skills through regular practice and instruction.

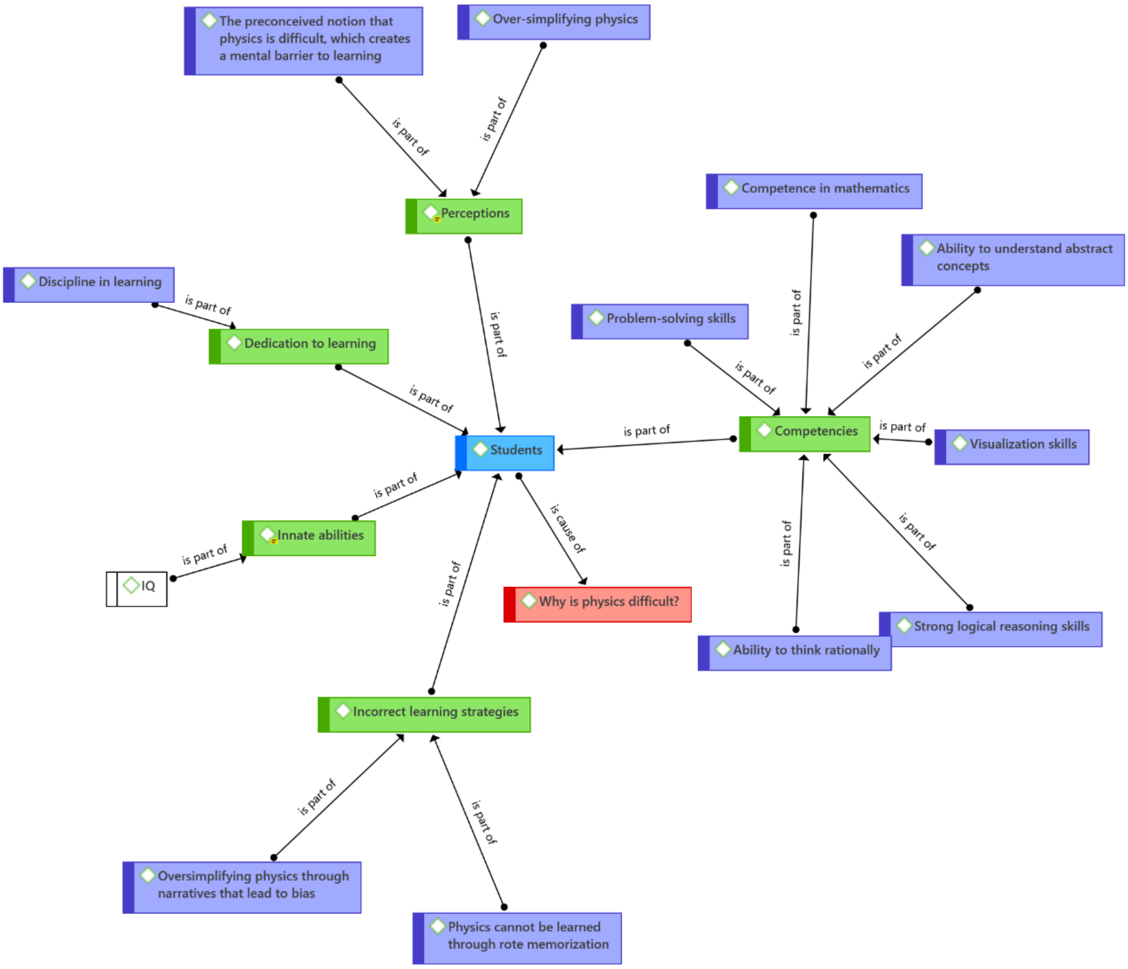

Figure 4. Student network display
Source: Calculation conducted by the author using ATLAS.ti v.9

Learning proficiency in physics requires other skills besides natural aptitude and perseverance. These abilities encompass rational thinking, logical reasoning, comprehension of abstract concepts, problem-solving skills, visualization, and proficiency in mathematics. A physics student must not only comprehend principles through writing but also possess the ability to identify and utilize mathematical patterns in real-world scenarios. Another challenge frequently encountered by students is the unfavorable view of physics as an esoteric and challenging discipline. Perception can give rise to impractical expectations and impede the process of learning. Another obstacle is the incorrect approach to learning. Most students tend to commit physics concepts to memory rather than comprehend them profoundly, although relying on memorization would not yield any significant progress. To comprehend the patterns and mathematical language underlying physical phenomena, one must possess a thorough comprehension devoid of any subjective narrative or personal prejudice in perceiving reality.

Theme 4: The disparity between physicists and non-experts

Understanding physics requires a significant degree of discipline. Physicists have undergone a challenging and protracted procedure to advance this field of research. On the other hand, individuals who are not experts have yet to undergo this procedure. Presumably, the difficulty of physics lies in its complexity for individuals with specialized knowledge. Physics continues to present obstacles, even for those specializing in the field. If the comprehension of physics were effortless, we would all possess the intellectual prowess of eminent scientists like Einstein and Dirac. Indeed, individuals without specialized knowledge will encounter a significant obstacle. Not only must they comprehend something that is not intrinsically straightforward, but they must also do it without grasping the purpose and constraints of comprehending physics itself. The perceived difficulty of physics for most individuals stems from their lack of comprehension of the nature and boundaries of the field. Therefore, to comprehend physics, knowing its extent and limitations is necessary.

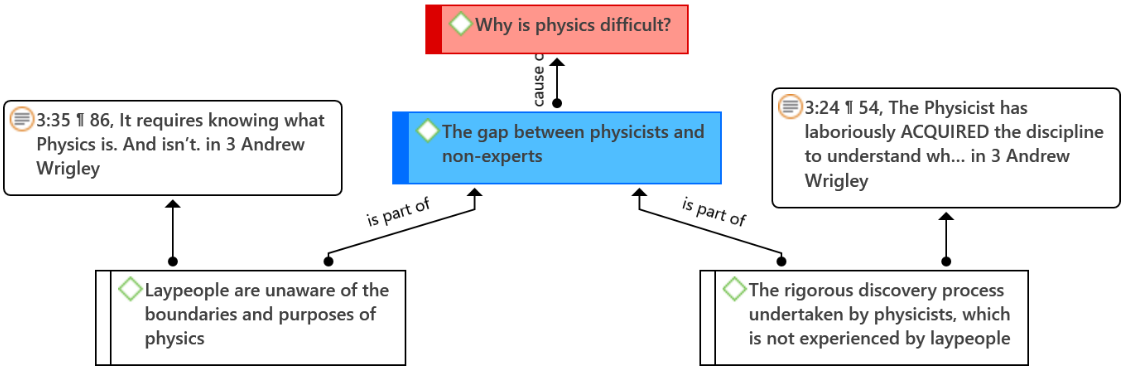

Figure 5. Display network gap between physicists and laypeople
Source: Calculation conducted by the author using ATLAS.ti v.9

The research findings indicate that the intricate nature of physics, which surpasses the everyday experiences of average individuals, is a primary contributing element to the difficulty in comprehending physics. “Common-Sense Physics” theory further supports our observation that laypeople struggle to comprehend the objectives and limitations of physics (Vicovaro, 2023). The idea posits that individuals without specialized knowledge in physics possess their own innate intuitions and cognitive frameworks regarding the nature of the world. These intuitions and frameworks frequently conflict with the established laws of physics, resulting in mistakes and challenges when attempting to comprehend abstract concepts in physics.

The research showed that mental disparities between physicists and non-experts contribute to challenges in comprehending physics. The results align with Viennot (2001), which highlighted the disparities in logical thinking in physics between physicists and non-experts. This study’s findings indicate that the inability to differentiate between “what falls under the domain of physics and what does not” is a substantial obstacle, as non-experts often rely on everyday logic, which is not consistently reliable in explaining natural events. These findings suggest that physics teachers should employ practical learning approaches and prioritize comprehending the breadth and limitations of physics.

Through employing this method, those without specialized knowledge can gain a more comprehensive comprehension of the intricacies of physical science.

Theme 5: Curriculum

The curriculum presents an additional challenge in comprehending physics, notably due to insufficient allocated time for learning. Furthermore, the curriculum frequently requires mastering substantial content within a constrained timeframe. Consequently, teachers must hastily instruct to cover all the necessary subjects. The situation necessitates them to forgo the pursuit of material expansion and in-depth examination. Indeed, conducting thorough analysis is important to develop a robust comprehension of abstract and intricate physics principles. However, students merely acquire the surface-level understanding that is readily forgotten. Insufficient learning time also hinders pupils from sufficiently practicing and applying physics ideas.

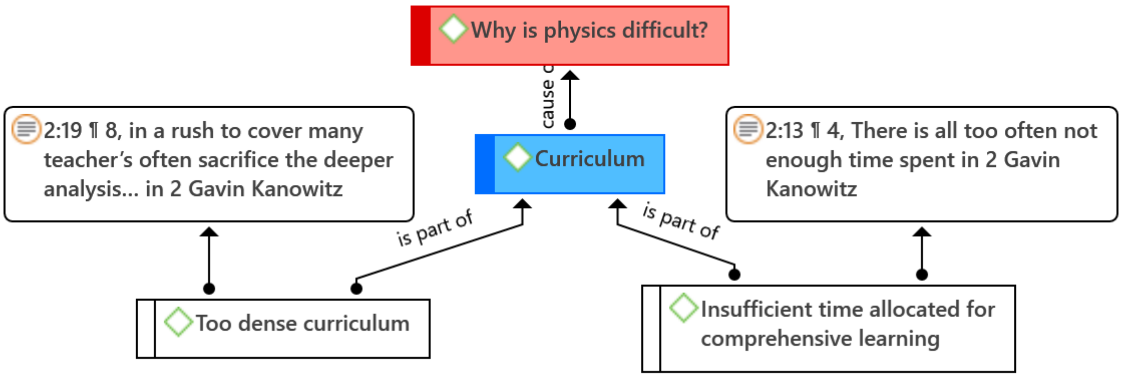

Figure 6. Curriculum network display
Source: Calculation conducted by the author using ATLAS.ti v.9

The research findings indicate that a primary obstacle to comprehending physics lies in curriculum-related issues, particularly the constraints of limited learning time and too dense material. These findings correspond with Sunardi et al. (2022), who identified time constraints as a barrier for educators in facilitating optimal physics instruction.

In addition, our study findings indicate that the overcrowded curriculum restricts teachers' ability to engage in teaching approaches that prioritize profound comprehension. The results related to our previous findings that insufficient time for practice and application hinders students' ability to effectively incorporate the knowledge they have gained into a more comprehensive and contextualized understanding. Ouattara et al. (2024) emphasized the need for teacher inclusion in curriculum design. They proposed the redesign of standardized textbooks to address content overload and ensure clearer conceptual understanding.

Theme 6: Parenting Style

Parenting significantly influences the development of children's curiosity and aptitude for acquiring knowledge in physics starting at a young age. By fostering a child's innate curiosity and cultivating their critical thinking abilities from a young age, they will be better equipped to excel in the study of physics, a discipline that requires both curiosity and advanced cognitive capabilities. In contrast, when parents fail to offer sufficient support or set high expectations for their children to consistently study, challenge their capabilities, and cultivate abstract thinking talents, it will impede children's progress in physics.

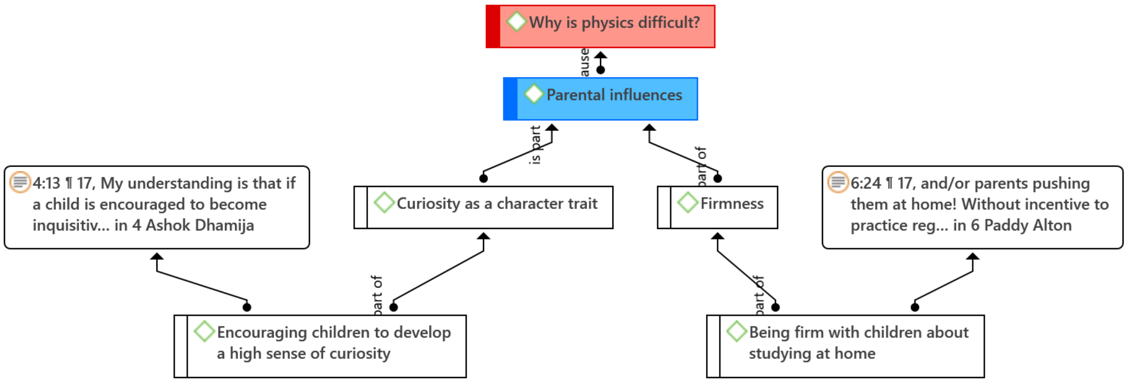

Figure 7. Parenting network display
Source: Calculation conducted by the author using ATLAS.ti v.9

Research indicates that parental engagement is essential for fostering children's initial enthusiasm and proficiency in physics. The results align with Gülhan (2023) study, which asserts that parental support and encouragement to investigate scientific phenomena can enhance children's enthusiasm for further education in science.

In contrast, the research additionally showed the detrimental effect of insufficient parental encouragement on the advancement of children's physics skills. This study aligns with the findings of Camarero-Figuerola et al. (2020) and Uludağ and Erkan (2023), who argued that a lack of parental involvement in children's science education is linked to diminished motivation and academic performance in physics topics. Additionally, the role of parents in shaping children's educational experiences cannot be overstated. Research by Ndwandwe (2024) shows that effective parental involvement includes monitoring academic progress and engaging in educational activities, which are essential for fostering a supportive learning environment. Similarly, the work of Anastasiou and Papagianni supports the notion that parental involvement is a significant factor in students' academic performance, reinforcing the idea that active participation from parents leads to better educational outcomes(Anastasiou & Papagianni, 2020). Therefore, this impacted their perception that physics is a challenging topic. These findings confirm that supportive and motivated parenting increases children's enthusiasm for learning physics and equips them to tackle intricate academic problems.

Theme 7: The major's origin

From the outset, the degree of linearity in a person's chosen field of study also impacts the level of complexity encountered when learning physics. Medical students who have mostly studied biology and medicine may encounter greater difficulty understanding physics due to the stark differences in conceptual frameworks between the two disciplines. They must establish a fundamental knowledge base and cognitive frameworks that diverge from their accustomed ones. Conversely, students pursuing physics, engineering, or mathematics degrees will find studying physics more manageable due to the interconnectedness and shared cognitive frameworks between these disciplines.

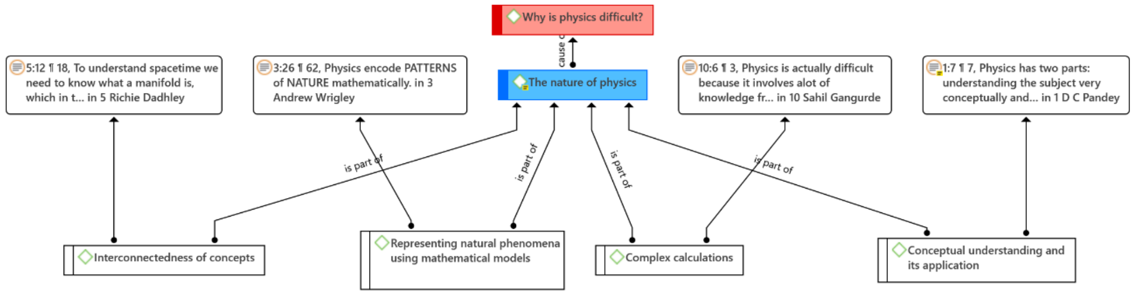

Figure 8. Network display of major origin
Source: Calculation conducted by the author using ATLAS.ti v.9

The results show that the degree of linearity in one's chosen field of study has a notable impact on the level of complexity experienced in acquiring knowledge in physics. Tindan and Arthur (2024) conducted research that supports the notion that non-physics students need help with abstract physics concepts that involve quantitative reasoning, particularly if they lack a solid background in mathematics and physics. The findings of this study emphasize that students who do not have a background in physics need to rely on other knowledge foundations and thinking patterns. The result can be more difficult for them than the descriptive ways they are accustomed to studying biology and medicine.

However, research shows that students pursuing physics, engineering, or mathematics majors experience fewer challenges when learning physics. Research indicates that students who have a stronger foundation in physics concepts often utilize more sophisticated learning strategies. Amiruddin et al. (2022) highlight the significance of integrating the STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach into physics education, which enhances conceptual understanding and encourages the application of effective learning strategies among students. This integration fosters a more holistic educational experience, allowing students to draw connections between different disciplines, thereby improving their comprehension of physics concepts. Moreover, the study by Wahono et al. (2020) suggests that project-based learning, a key component of STEM education, significantly benefits students' understanding of physics by promoting active engagement and critical thinking skills. Such strategies are particularly effective for students with a background in physics, as they are more likely to engage deeply with the material and apply their knowledge in practical contexts. The findings corroborate the notion that a sequential educational foundation in physics might enhance the ease and efficacy of the learning process, aligning with the constructivist theory that posits new knowledge is constructed upon pre-existing knowledge.

CONCLUSION

This study identifies seven primary factors contributing to students' perception of physics as challenging. The first factor is the abstract and mathematical nature of physics, wherein students struggle to correlate physical theories with real-world phenomena. The prevalence of complex mathematical equations and formulas poses a significant barrier for students with lower confidence in their mathematical abilities. The second factor pertains to pedagogical issues, including inadequate concept elucidation, insufficient contextual examples, and a lack of innovative teaching methodologies. The third factor relates to student-specific issues, encompassing pre-existing negative perceptions, anxiety and stress, diminished interest in scientific disciplines, low self-efficacy, and varying proficiencies in critical and analytical thinking. The fourth factor is the comprehension gap between physicists and non-experts, where technical terminology and novel specialized concepts render physics seemingly inaccessible or excessively complex to non-specialists. Curriculum-related issues constitute the fifth factor, with overly dense content leaving minimal opportunity for practical exploration and in-depth analytical engagement. The sixth factor involves parental influence, where early parental encouragement in scientific exploration can mitigate subject-related difficulties. The final factor is the linearity of academic trajectories. The more aligned a student's academic path is with physics, the more adept they become at mastering the requisite skills, whereas less linear paths may result in increased perceived difficulty.

This study is limited by its data source, as it relies solely on comments from the Quora platform. Additionally, the research employs a qualitative approach, which, while offering in-depth insights, may only partially capture the breadth of the phenomenon. Future research could broaden the scope of data sources by incorporating other platforms such as Twitter, YouTube, or similar media. Conducting field studies through interviews or direct observations may provide more prosperous, more contextualized data. Furthermore, integrating quantitative data through a mixed-methods approach would enable a more comprehensive and generalizable understanding of students' challenges in learning physics.

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